bead that is lower than an ambient gas pressure, and wherein said splash controller is configured to physically intercept said chemical.

B1 cut

A marked-up version of this claim appears in Appendix I to this amendment and response.

REMARKS

Claims 34-37 and 41-43 were pending up to this amendment and response.

Claims 34-37 and 41-43 are rejected.

Claims 34-35 and 41-43 are cancelled without prejudice.

Claim 36 is amended.

Claims 36-37 are pending.

I. Provisional rejection of claims for double patenting

The Examiner provisionally rejected the pending claims based on double patenting, arguing that the present claims are not patentably distinct in light of claims 38-40 of copending application Ser. No. 09/652,969 (attorney docket # 93-0421.05). Applicant notes, however, that these applications are divisional applications of application Ser. No. 09/133,989 (attorney docket # 93-0421.03) and are the result of a restriction requirement in that parent application, wherein the Patent and Trademark Office found the pending claims to be separately patentable from claims 38-40. (*See* the Office Action dated 3/21/00 of U.S. application Ser. No. 09/133,989, included in Appendix II to this Amendment and Response). In the interest of consistency, Applicant requests that the Examiner withdraw this provisional rejection.

II. Rejection of claims under §102

The Examiner rejected claims 34, 35, and 41-43 as being anticipated by Iwata (U.S. Patent No. 4,611,553). Applicant shall argue in favor of those claims in a related application and request that they be cancelled without prejudice.

The Examiner rejected only claim 34 and its dependent claims 36 and 37 as being anticipated by Hurtig (U.S. Patent No. 5,289,222). As mentioned above, Applicant shall argue in favor of claim 34 in a related application and requests that claim 34 be cancelled without prejudice. As for claims 36 and 37, they are dependent upon claim 35, which the Examiner has not rejected under Hurtig. Accordingly, claims 36-37 should be found to be novel.

Conclusion

In light of the above remarks, Applicant submits that claims 36-37 are allowable over the applied reference. Therefore, Applicant respectfully requests reconsideration of the Examiner's rejection and further requests allowance of all of the pending claims. If there are any matters which may be resolved or clarified through a telephone interview, the Examiner is requested to contact Applicant's undersigned attorney at the number indicated.

Respectfully submitted,

Charles Brantley

Date: 7/19/1

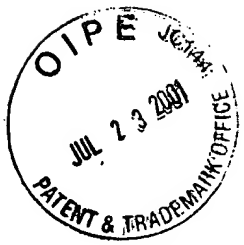
Charles B. Brantley II
Reg. No. 38,086
Micron Technology, Inc.
8000 S. Federal Way
Boise, ID 83716-9632
(208) 368-4557
ATTORNEY FOR APPLICANT

Appendix I: Marked-up version of claim

36. (Once amended) [The device in claim 35,] A device for an edge bead, comprising:

a dispenser configured to release a chemical toward said edge bead; and

a splash controller around said dispenser, physically unattached from said edge bead, and configured to draw said chemical toward said splash controller, wherein said splash controller is configured to generate a gas pressure around said edge bead that is lower than an ambient gas pressure, and wherein said splash controller is configured to physically intercept said chemical.



Appendix II

Office Action dated 3/21/00 of U.S. application Ser. No. 09/133,989

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/133,989	08/14/98	DOAN T	93-0421.03

IM22/0321

CHARLES B BRANTLEY II
8000 S FEDERAL WAY
M S 525
BOISE ID 83716-9632

EXAMINER
EDWARDS, L

ART UNIT	PAPER NUMBER
1734	4

DATE MAILED: 03/21/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.	Applicant(s)
09/133989	Doan
Examiner	**Group Art Unit**
L. Edwards	1734

—The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address—

Peri d for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication .
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

☐ Responsive to communication(s) filed on _____.

☐ This action is **FINAL.**

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle,* 1935 C.D. 1 1; 453 O.G. 213.

Disposition of Claims

☒ Claim(s) 1 and 12-43 is/are pending in the application.

Of the above claim(s) 34-43 is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 1 and 12-33 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claim(s) _____ are subject to restriction or election requirement.

Application Papers

☒ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Pri rity under 35 U.S.C. § 119 (a)-(d)

☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 11 9(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number) _____.

☐ received in this national stage application from the International Bureau (PCT Rule 1 7.2(a)).

*Certified copies not received: _____.

Attachm nt(s)

☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). 3

☐ Interview Summary, PTO-413

☒ Notice of Reference(s) Cited, PTO-892

☐ Notice of Informal Patent Application, PTO-152

☒ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Other _____

Office Action Summary

Election/Restriction

Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1 and 12-33, drawn to a solvent dispenser/suction device, classified in class 118, subclass 50.

II. Claims 34-37 and 41-43, drawn to a dispenser/splash control device, classified in class 118, subclass 60.

III. Claims 38-40, drawn to a movable dispenser/movable suction device, classified in class 118, subclass 323.

The inventions are distinct, each from the other because of the following reasons: Inventions I-III are deemed independent and distinct inventions in that each invention requires particulars not required by the other invention. For instance, the invention of Group I is to a dispesner/suction device and the invention of Group II is to a dispenser and splash control device which does not require a suction device and could include a housing in combination with the dispesner to control splash. As for the invention of Group III relative to the inventions of Groups I and II, it requires movable parts such as a movable nozzle and a movable suction device as the inventions of Groups I and II do not require any movable parts.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

During a telephone conversation with Mr. Brantley on 3/14/2000 a provisional election was made with traverse to prosecute the invention of Group I, claims 1 and 12-33. Affirmation of this election must be made by applicant in replying to this Office action. Claims 34-43 are withdrawn from further consideration by the examiner, 37 CAR 1.142(b), as being drawn to a non-elected invention.

Specification

The disclosure is objected to because of the following informality: on page 1, line 1, Applicant is suggested to update the history of the former case as to being abandoned or allowed and corresponding patent number(s).

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 12-14, and 16-33 rejected under 35 U.S.C. 102(a) as being anticipated by Japanese Patent No. 8-5825.

The Japanese Patent teaches an apparatus for removing coating from the edge of a substrate comprising means (12) for dispensing a developing solution onto the edge of the substrate and means (11) surrounding the dispensing means for vacuuming excess developing solution and dissolved coating material from the edge of the substrate (See Figs. 1-3). Inherently, the developing solution dispensed from the dispensing means constitutes a solvent as the developing solution permeates the built-up part or edge bead of the coated substrate and removes the built-up part as evidenced by the abstract in the last four lines.

Claims 1, 14-18, 20, 21, 24, and 28-30 are rejected under 35 U.S.C. 102(b) as being anticipated by Uchida et al (JP 56-73579).

Uchida et al teach an apparatus for removing coating from the edge of a substrate comprising means (4) for dispensing a solvent (i.e., water) onto the edge of the substrate and means (5) surrounding the dispensing means for vacuuming excess solvent and dissolved coating material from the edge of the substrate (See Figs. 1-3).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 19, 22, 23, 25-27, and 31-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uchida et al (JP 56-73579) in view of Japanese Patent No. 8-5825.

Uchida et al teach an apparatus for removing the thick film part or edge bead of a coated edge comprising a nozzle (4) configured to apply a solvent (i.e., water) to an edge of a substrate, and a vacuum mechanism (5) enveloping the nozzle to remove excess solvent and dissolved coating material from the substrate edge. Uchida et al fail to teach or suggest the vacuum mechanism enveloping the edge of the substrate. However, it was known in the art at the time the

invention was made, to provide a vacuum mechanism enveloping a solvent dispensing nozzle as well as the edge of a coated substrate in order to facilitate the removal of coating build-up on the edge of a substrate from its top and bottom surface as evidenced by Japanese Patent No. 8-5825. Therefore, it would have been obvious to one of ordinary skill in the art to modify the Uchida et al apparatus to envelop the dispensing nozzle as well as the edge of the substrate with a vacuum mechanism as taught by the Japanese Patent in order to optimize the removal of coating build-up from the edge of the substrate.

With respect to claim 22, Uchida et al teach an apparatus including a coaxial dispenser and suction device provided on the top surface of a coated substrate. Uchida et al are silent concerning providing such an apparatus on the top and bottom of the substrate and further having the suction device encompass both the top and bottom dispensers. However, it was known in the art at the time the invention was made to provide top and bottom dispensers with an encompassing suction device disposed about the dispensers in order to facilitate removal from the top and even the bottom of the coated substrate as evidenced by Japanese Patent No. 8-5825. Therefore, it would have been obvious to one of ordinary skill in the art to modify the Uchida et al apparatus to provide top and bottom dispensers and encompass both dispensers with the suction device in order to completely remove any coating material build-up from the top surface as well any material that reaches the bottom surface of the substrate.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following patent recognizes the state of the art with respect to combined dispenser and suction devices: Bell et al.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to L. Edwards whose telephone number is (703) 308-4252. The examiner can normally be reached on Monday-Thursday from 8:30AM-6:00PM. The examiner can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino, can be reached at (703) 308-3853. The fax phone number for Art Unit 1734 is (703) 305-7115.

Any inquiry of a general nature such as status inquiries should be directed to the Group receptionist whose telephone number is (703) 308-0661.

LAURA EDWARDS
PRIMARY EXAMINER
GROUP 1300
1734

le

March 20, 2000

FORM PTO-948 (REV. 01-97) U.S. DEPARTMENT OF COMMERCE-Patent and Trademark Office Application No. 1539

NOTICE OF DRAFTPERSON'S PATENT DRAWING REVIEW

The drawing filed (insert date) 8/14/98 are:

A. _____ not objected to by the Draftperson under 37 CFR 1.84 or 1.152.

B. _____ objected to by the Draftperson under 37 CFR 1.84 or 1.152 as indicated below. The Examiner will require submission of new, corrected drawings whe necessary. Corrected drawings must be submitted according to the instructions on the back of this notice.

1. DRAWINGS. 37 CFR 1.84(a): Acceptable categories of drawings: Black ink. Color.
   - _____ Color drawing are not acceptable until petition is granted. Fig.(s) _____
   - _____ Pencil and non black ink is not permitted. Fig(s)_____
2. PHOTOGRAPHS. 37 CFR 1.84(b)
   - _____ Photographs are not acceptable until petition is granted,
   - _____ 3 full-tone sets are required. Fig(s)_____
   - _____ Photographs not properly mounted (must brystol board or photographic double-weight paper). Fig(s)_____
   - _____ Poor quailty (half-tone). Fig(s)_____
3. TYPE OF PAPER. 37 CFR 1.84(e)
   - _____ Paper not flexible, strong, white and durable. Fig.(s)_____
   - _____ Erasures, alterations, overwritings, interlineations, folds, copy machine marks not acceptable. (too thin)
   - _____ Mylar, vellum paper is not acceptable (too thin). Fig(s)_____
4. SIZE OF PAPER. 37 CFR 1.84(F): Acceptable sizes:
   - _____ 21.0 cm by 29.7 cm (DIN size A4)
   - _____ 21.6 cm by 27.9 cm (8 1/2 x 11 inches)
   - _____ All drawings sheets not the same size. Sheet(s)_____
5. MARGINS. 37 CFR 18.4(g): Acceptable margins:
   Top 2.5 cm Left 2.5 cm Right 1.5 cm Bottom 1.0 cm SIZE: A4 Size
   Top 2.5 cm Left 2.5 cm Right 1.5 cm Bottom 1.0 cm SIZE: 8 1/2 x 11
   - _____ Margins not acceptable. Fig(s)_____
   - _____ Top (T) _____ Left (L)
   - _____ Right (R) _____ Bottom (B)
6. VIEWS. CFR 1.84(h)
   REMINDER: Specification may require revision to correspond to drawing changes.
   - _____ Views connected by projection lines or lead lines. Fig.(s)_____

   Partial views. 37 CFR 1.84(h)(2)
   - _____ Brackets needed to show figure as one entity. Fig.(s)_____
   - _____ Views not labeled separately or properly. Fig.(s)_____
   - _____ Enlarged view not labeled separately or properly. Fig.(s)_____
7. SECTIONAL VIEWS. 37 CFR 1.84(h)(3)
   - _____ Hatching not indicated for sectional portions of an object. Fig.(s)_____
   - _____ Sectional designation should be noted with Arabic or Roman numbers. Fig.(s)_____
8. ARRANGEMENT OF VIEWS. 37 CFR 1.84(i)
   - _____ Words do not appear on a horizontal, left-to-right fashion when page is either upright or turned, so that the top becomes the right side, except for graphs. Fig.(s)_____
   - _____ Views not on the same plane on drawing sheet. Fig.(s)_____
9. SCALE. 37 CFR 1.84(k)
   - _____ Scale not large enough to show mechansim with crowding when drawing is reduced in size to two-thirds in reproduction. Fig.(s)_____
10. CHARACTER OF LINES, NUMBERS, & LETTERS. 37 CFR 1.84(l)
    - _____ Lines, numbers & letters not uniformly thick and well defined, clean, durable and black (poor line quality). Fig.(s)_____
11. SHADING. 37 CFR 1.84(m)
    - _____ Solid black areas pale. Fig.(s)_____
    - _____ Solid black shading not permitted. Fig.(s)_____
    - _____ Shade lines, pale, rough and blurred. Fig.(s)
12. NUMBERS, LETTERS, & REFERENCE CHARACTERS. 37 CFR 1.48(p)
    - _____ Numbers and reference characters not plain and legible. Fig.(s)_____
    - _____ Figure legends are poor. Fig.(s)_____
    - _____ Numbers and reference characters not oriented in the same direction as the view. 37 CFR 1.84(p)(3) Fig.(s)_____
    - _____ Engligh alphabet not used. 37 CFR 1.84(p)(3) Fig.(s)_____
    - _____ Numbers, letters and reference characters must be at least .32 cm (1/8 inch) in height. 37 CFR 1.84(p)(3) Fig.(s)_____
13. LEAD LINES. 37 CFR 1.84(q)
    - _____ Lead lines cross each other. Fig.(s)_____
    - _____ Lead lines missing. Fig.(s)_____
14. NUMBERING OF SHEETS OF DRAWINGS. 37 CFR 1.48(t)
    - _____ Sheets not numbered consecutively, and in Ababic numerals beginning with number 1. Fig.(s)_____
15. NUMBERING OF VIEWS. 37 CFR 1.84(u)
    - _____ Views not numbered consecutively, and in Abrabic numerals, beginning with number 1. Fig.(s)_____
16. CORRECTIONS. 37 CFR 1.84(w)
    - _____ Corrections not made from PTO-948 dated _____
17. DESIGN DRAWINGS. 37 CFR 1.152
    - _____ Surface shading shown not appropriate. Fig.(s)

FORM: PTO-1449 (REV: 7-80)	U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	Atty Docket No: 93-0421.03	Serial No: 09/133,989
		Applicant: Trung T. Doan	
	INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Filing Date: 08/14/98	Group: 1762
(37 CFR 1.98(b))	*(use several sheets if necessary)*		

U.S. PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Name	Class	Subclass	
	AA	5,952,050	09/14/99	Doan	427	336	
	AB	5,705,223	01/06/98	Bunkofske	427	240	
	AC	5,580,607	12/03/96	Takekuma et al.	427	240	
	AD	5,474,807	12/12/95	Koshiishi	427	240	
	AE	5,444,921	08/29/95	Milina	033	833	
	AF	5,378,511	01/03/95	Cardinali et al.	427	600	
	AG	5,362,608	11/08/94	Flaim et al.	430	327	
	AH	5,358,740	10/25/94	Bornside et al.	427	240	
	AI	5,294,257	03/15/94	Kelly et al.	118	052	
	AJ	5,289,222	02/22/94	Hurtig	354	317	
	AK	5,279,926	01/18/94	Chandler et al.	430	311	
	AL	5,238,713	08/24/93	Sago et al.	427	240	
	AM	5,151,219	09/29/92	Salamy et al.	252	364	
	AN	5,103,102	04/07/92	Economou et al.	250	492.2	
	AO	5,013,586	05/07/91	Cavazza	427	240	
	AP	4,899,685	02/13/90	Kawakami	118	050	
	AQ	4,886,728	12/12/89	Salamy et al.	430	331	
	AR	4,838,979	06/13/89	Nishida et al.	156	345	
	AS	4,790,262	12/13/88	Nakayama et al.	118	052	
	AT	4,732,785	03/22/88	Brewer	427	240	
	AU	4,685,975	08/11/87	Kottman et al.	134	033	
	AV	4,668,334	05/26/87	Doornveld	156	640	
	AW	4,611,553	09/16/86	Iwata et al.	118	050	
	AX	4,576,796	03/18/86	McCormick	422	099	
	AY	4,518,678	05/21/85	Allen	430	311	
	AZ	4,510,176	04/09/85	Cuthbert et al.	427	082	
	BA	4,393,807	07/19/83	Fujimura et al.	118	501	
	BB	4,113,492	09/12/78	Sato et al.	096	067	
	BC	3,834,083	09/10/74	Hoshi et al.	051	057	

FOREIGN PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Country	Class	Subclass	Translation Yes	Translation No
	BD	56-73579	06/18/81	Japan	~~B05D~~ 7/04	~~G03C~~ ~~1/74~~	☒	☐
	BE						☐	☐
	BF						☐	☐

Examiner Y. S. Date Considered: 3/2000

Notice of References Cited

Application No.	Applicant(s)
09/133989	Doan

Examiner	Group Art Unit	Page
L. Edwards	1734	1 of 1

U.S. PATENT DOCUMENTS

*		DOCUMENT NO.	DATE	NAME	CLASS	SUBCLASS
	A	3900866	8-19-75	Bell et al		
	B					
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L				—	
	M					

FOREIGN PATENT DOCUMENTS

*		DOCUMENT NO.	DATE	COUNTRY	NAME	CLASS	SUBCLASS
	N	8-5825	1-12-96	Japan	—	—	—
	O						
	P						
	Q						
	R						
	S						
	T						

NON-PATENT DOCUMENTS

*		DOCUMENT (Including Author, Title, Source, and Pertinent Pages)	DATE
	U		
	V		
	W		
	X		

* A copy of this reference is not being furnished with this Office action.
(See Manual of Patent Examining Procedure, Section 707.05(a).)

⑲日本国特許庁(JP)　⑪特許出願公開

⑫公開特許公報(A)　平2−157763

⑤Int. Cl.⁵	識別記号	庁内整理番号	㊸公開　平成2年(1990)6月18日
G 03 F 7/42		7124−2H	
H 01 L 21/027			
		7376−5F　H 01 L 21/30　361 W	

審査請求　未請求　請求項の数 1　(全3頁)

㊹発明の名称　レジスト除去装置

㉑特　願　昭63−312353
㉒出　願　昭63(1988)12月9日

㉗発明者　磯野　謙二　大阪府大阪市阿倍野区長池町22番22号　シャープ株式会社内
㉑出願人　シャープ株式会社　大阪府大阪市阿倍野区長池町22番22号
㉔代理人　弁理士　大西　孝治

明　細　書

1. 発明の名称

レジスト除去装置

2. 特許請求の範囲

(1) 表面にレジストを塗布した基板の端縁部分を収容しこの端縁部分のレジストを除去する溶剤の供給孔と前記溶剤の排出孔と前記溶剤の蒸気の排気孔とを有するノズルを設けたことを特徴とするレジスト除去装置。

3. 発明の詳細な説明

＜産業上の利用分野＞

本発明はガラス基板等のエッジ、サイド、バックに形成されたレジストを除去するレジスト除去装置に関する。

＜従来の技術＞

従来はガラス基板等のエッジ、サイド、バックに形成されたレジストの除去手段がないので、なるべくガラス基板のエッジ、サイド、バックにレジストが回り込まないように注意を払ってガラス基板にレジストを塗布していた。

＜発明が解決しようとする課題＞

しかしながら、どうしてもレジストの回り込みが生じることがあり、このような場合には、ガラス基板のエッジ、サイド、バックに回り込んで形成されたレジストが取れてダストが生じ基板表面に付着する等のトラブルが発生して問題とされていた。

本発明は上記事情に鑑みて創案されたものであり、ガラス基板のエッジ、サイド、バックに回り込んで形成されたレジストを除去することができるレジスト除去装置を提供することを目的としている。

＜課題を解決するための手段＞

以上の問題点を解決するために、本発明のレジスト除去装置は、表面にレジストを塗布した基板の端縁部分を収容しこの端縁部分のレジストを除去する溶剤の供給孔と前記溶剤の排出孔と前記溶剤の蒸気の排気孔とを有するノズルを設けている。

＜作用＞

表面にレジストを塗布した基板の端縁部分の両側をノズルで保持収容し、ノズルの供給孔から溶剤を基板に吐出する。溶剤に当たったレジストは溶解し、溶解したレジストを含んだ溶剤の廃液はノズルの排出孔から排出され、溶剤の蒸気はノズルの排気孔から排出される。

＜実施例＞

以下図面を参照して本発明の一実施例を説明する。

第1図および第2図は本発明の一実施例を説明するための図面であって、第1図は断面図、第2図は斜視図である。

本実施例のレジスト除去装置は、オーバーノズル2とアンダーノズル3とからなるノズル100を有するものである。第1図に示すように、1は上表面にレジスト8が塗布されたガラス基板であり、レジスト8はガラス基板1のエッジ、サイド、バックにまでレジスト8が回り込んで塗布されたものである。断面ほぼコ字状のオーバーノズル2とアンダーノズル3とが、対向するように結合されてガラス基板1の一つの端縁部分11をこの端縁部分11の全長にわたって密着保持収容するとともに、オーバーノズル2およびアンダーノズル3は、第2図に示すように、それぞれ長手方向の両端を封止する封止板21および31を有しているので、オーバーノズル2とアンダーノズル3とが形成するスペース9は、端縁部分11を収容した状態で外気から遮断されている。

第1図および第2図に示すように、オーバーノズル2には、その長手方向に、レジスト8を溶かす溶剤（例えばシンナー）10をスペース9内に吐出するための複数個の供給孔4と、溶剤10の蒸気11をスペース9外へ排出する複数個の排気孔5とが形成されている。この排気孔5は図示しない排気装置に導かれている。アンダーノズル3には、その長手方向に、溶剤10の廃液12をスペース9外に排出する複数の排出孔6が形成されている。前記供給孔4、排気孔5、排出孔6は本実施例では何れも3個としているが3個にこだわるものではなく、基板の大きさ等に応じて適宜の個数にすることができる。

第1図に示す7はチャックであって、図示しない装置によって上下方向に移動可能であるとともに左右方向に回転可能となっている。そして、このチャック7の上部に設けた基板搭載板71でガラス基板1を下から安定して支持することができる。また、オーバーノズル2は図示しない装置によって上下方向に移動可能となっている。

第2図に示すように、レジスト除去装置100に対向するように、レジスト除去装置100と同様のレジスト除去装置200が、ガラス基板1の端縁部分11に対向する端縁部分にも設けられている。

次に、上記レジスト除去装置100および200によってガラス基板1のエッジ、サイド、バックのレジスト8を除去する方法について説明する。

レジスト除去装置100と200のアンダーノズル3を対向させて同一高さに配置する。チャック7の基板搭載板71の上面がアンダーノズル3の上面と同一高さになるまでチャック7を上昇させる。そして基板搭載板71とアンダーノズル3上にレジスト塗布面を上にしてガラス基板1を載置した後、レジスト除去装置100のオーバーノズル2を降下させてオーバーノズル2とアンダーノズル3とでガラス基板1の端縁部分11を保持収容する。同様に、レジスト除去装置200のオーバーノズル2を降下させてオーバーノズル2とアンダーノズル3とでガラス基板1の端縁部分11に対向する端縁部分を保持収容する。

次いで、レジスト除去装置100、200ともに、図示しない供給装置から送られて来る溶剤10をオーバーノズル2の供給孔4からスペース9内に吐出する。すると、吐出された溶剤10は、ガラス基板1のエッジのレジスト8には直接に当たり、サイドのレジスト8には直接或いはエッジから流れ落ちて当たり、またバックのレジスト8にはオーバーノズル2やアンダーノズル3の内面に反射してから当たって、それぞれのレジスト8が溶解される。溶けたレジスト8を含んだ溶剤10の廃液12は排出孔6から排出し、スペース9内の溶剤10の蒸気11は排気孔5から排出する。このようにして

端縁部分11と端縁部分11に対向する端縁部分のレジスト8 の除去が終了すると、オーバーノズル2を上昇させてガラス基板1 のレジスト除去作業の前半を終える。

次にチャック7 を90° 回転させてレジストが除去されていない端縁部分をレジスト除去装置100と200 のアンダーノズル3 上に配置する。そして、レジスト除去装置100 と200 のオーバーノズル2を降下させる。以下、レジスト除去作業の前半と同様の方法によってレジスト除去作業の前半においてレジストが除去されなかった端縁部分のレジストを除去してレジスト除去作業の後半を終える。

＜発明の効果＞

以上説明したように、本発明のレジスト除去装置は、表面にレジストを塗布した基板の端縁部分を収容し溶剤の供給孔と溶剤の排出孔と溶剤の蒸気の排気孔とを有するノズルを設け、供給孔から吐出した溶剤によって基板のエッジ、サイド、バックに塗布されたレジストを除去するものである。

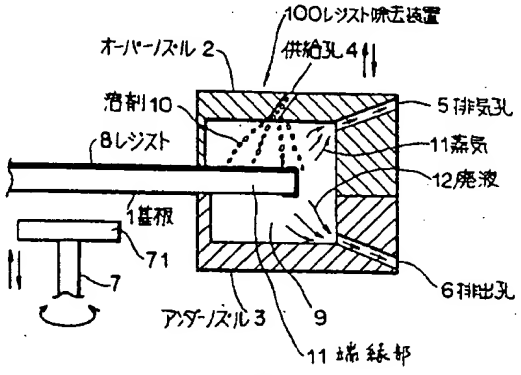
即ち、本発明のレジスト除去装置によれば、ガラス基板のエッジ、サイド、バックに回り込んで形成されたレジストを除去することができるので、このようなレジストによるダストの発生がない。従って、ダストによるトラブルも生じないので、基板、例えば液晶パネル等のガラス基板を用いる部品の歩留りを向上することができる。

4. 図面の簡単な説明

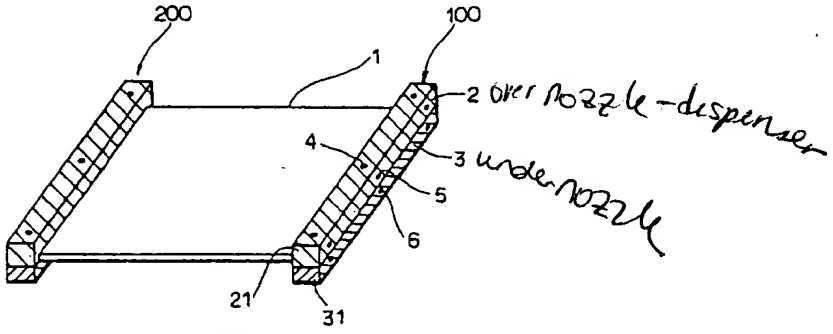
第1図および第2図は本発明の一実施例を説明するための図面であって、第1図は断面図、第2図は斜視図である。

1 ・・・ガラス基板、2 ・・・オーバーノズル、3 ・・・アンダーノズル、4 ・・・供給孔、5 ・・・排気孔、6 ・・・排出孔、7 ・・・チャック、8 ・・・レジスト、9 ・・・スペース、10・・・溶剤、11・・・蒸気、12・・・廃液。

特許出願人　シャープ株式会社
代 理 人　弁理士 大 西 孝 治



第1図



第2図

[Translation]

(19) Japan Patent Office (JP)

(12) **PATENT ISSUANCE REPORT**

(11) Patent Application Release No.
Patent Release **Hei. 2-157763**

(43)Release date: June 18, 1990

(51) Int.Cl.[5]	Identification Symbol	Office Control No.
G 03 F 7/42		7124-2H
H 01 L 21/027		
		7376-5F H 01 L 21/30 3 6 1 W

Examination requested: Not yet
Items in Application: 1 (Total 3 pages)

(54) **Name of Invention:** Resist Remover

(21) **Application No.**: Patent Application Sho.63-312353

(22) **Application date**: December 9, 1988

(72) **Inventor**: Kenji Isono
c/o Sharp Corporation
22-22 Nagaike-cho, Abeno-ku, Osaka-shi, Osaka [Japan]

(71) **Applicant**: Sharp Corporation.
22-22 Nagaike-cho, Abeno-ku, Osaka-shi, Osaka [Japan]

(74) **Agent**: Koji Onishi, Patent attorney

Specifications

1. **Name of Invention:** Resist Remover

2. **Scope of Patent Application**

(1) A resist remover which is characterized by having installed

- A nozzle with supply holes for solvent which enclose the edge areas of a substrate with resist applied to its surface and remove resist from these edge areas,
- discharge ports for the above-noted solvent, and
- exhaust ports for the above-noted solvent's vapor.

3. **Detailed Explanation of Invention**

Field for Commercial Utilization: This invention bears on a resist-removing device for removing resist formed on the edges, sides and back of glass substrates and the like.

Usual Technology: Previously, there has been no means to remove resist formed on the edges, sides and back of glass substrates and the like, so that extra care was taken not to let resist move around onto such areas of glass substrates, etc., when applying a resist.

Problems the Invention Seeks to Resolve: Still, resist somehow has moved around onto such areas. When it is removed in such cases, it gives rise to dust, which causes trouble by adhering to substrate surfaces.

This invention was devised after taking the above-noted situation into account and has the aim of providing a resist remover that can remove the resist that has moved around to and formed on glass substrate edges, sides and backs.

Means to Resolve Problems To resolve the above-noted problem, the resist remover of this invention is equipped with a nozzle enclosing edge areas of substrates on which resist has been applied and, for removing resist from these edge areas, has a supply holes for solvent, a discharge port for the above-noted solvent's waste and an exhaust port for the above-noted solvent's vapor.

Effects: Both sides of the edge areas of a substrate on which resist has been applied to the surface are enclosed by the nozzle and solvent is sprayed onto the substrate from the nozzle's supply holes. Resist subjected to the solvent dissolves and solvent waste including the dissolved resist is discharged from the nozzle's discharge port, while the solvent's vapor is exhausted from the nozzle's vapor ports.

Application Example: Below I will explain one application example of this invention while referring to the figures.

Figures 1 and 2 are diagrams illustrating one application example of this invention, with Figure 1 being a cross-sectional diagram and Figure 2 an oblique view.

The resist remover of this application example has a nozzle 100 consisting of over-nozzle 2 and under-nozzle 3. As shown in Figure 1, 1 is a glass substrate with resist 8 applied to its upper surface. The applied resist 8 has moved around to the edges, sides and back of glass substrate 1. Over-nozzle 2, nearly bracket-shaped in cross section, and under-nozzle 3 are joined, set opposite to each other and closely enclose the entire length of one edge area 11 of glass substrate 1. Also, as shown in Figure 2, over-nozzle 2 and under-nozzle 3 both have sealing plates 21 and 31 which seal the edges along their length, so that space 9 formed by over-nozzle 2 and under-nozzle 3 contains edge area 11 and seals it off from the outer air.

As shown in Figures 1 and 2, along the long axis of over-nozzle 2 are multiple supply holes 4 for spraying into space 9 the solvent 10 (such as thinner) which dissolves resist 8; and multiple exhaust ports 5 made so as to exhaust solvent 10's vapor from space 9. These exhaust ports lead to an exhaust system not illustrated. Under-nozzle 3 has along its long axis multiple discharge ports 6 which discharge solvent 10's spent liquid 12 out of space 9. In this application example, there are three each of the above-noted supply holes 4, exhaust ports 5 and discharge ports 6, but that number is not sacrosanct and can be appropriately changed according to the size of the substrate.

Part 7 shown in Figure 1 is a chuck. It not only can be moved up and down by a device not illustrated, but also can be rotated left or right. And with substrate mounting plate 71 installed on the upper part of this chuck 7, a substrate 1 can be stably supported from below. Also, over-nozzle 2 can be moved up or down by a device not shown.

As shown in Figure 2, installed to face resist remover 100 is resist remover 200, which is identical to remover 100 and installed on the opposite edge 11 of glass substrate 1.

Next, I will explain the method of removing resist 8 from the edges, sides and backs of glass substrate 1 using the above-noted resist removers 100 and 200.

Facing the resist remover 100 and 200 under-nozzle, chuck 7 is raised until the upper surface of its substrate mounting

plate 71 is the same height as the upper surface of under-nozzle 3. Then, after mounting glass substrate 1 with its resist side up and upon under-nozzle 3 and substrate mounting plate 71, resist remover 100's over-nozzle 100 is lowered to hold and contain glass substrate 1's edge area 11 with over-nozzle 2 and under-nozzle 3. Similarly, by lowering resist remover 200's over-nozzle 2 one holds and contains facing glass substrate 1's edge area 11 between over-nozzle 2 and under-nozzle 3.

Next, resist removers 100 and 200 both spray solvent 10 delivered from a supply device not shown into space 9 from supply holes 4 in over-nozzle 2. That makes the sprayed solvent 10 strike the glass substrate's edge resist 8 directly or by splashing from the inner surfaces of over-nozzle 2 or under-nozzle 3 to hit resist 8 on the sides. The back is similarly struck by solvent splashed from the same inner surfaces so that each part of resist 8 is dissolved. Waste solution 12 of solvent 10, including dissolved resist 8 is discharged from discharge port 6, while vapor 11 of solvent 10 in space 9 is exhausted from exhaust port 5. In this way, removal of resist 8 on edge 11 and the opposite side's edge 11 is completed, over-nozzle 2 is raised and the first half of glass substrate 1's resist removal operation is ended.

Then, chuck 7 is rotated 90° and edge areas from which resist has not been removed are positioned on resist remover 100 and 200's under-nozzles 3. Next, over-nozzles 2 of resist removers 100 and 200 are lowered. Thereafter, the same method as the first half of the resist removal operation is used to remove resist 8 not previously removed to complete the second half of the removal operation.

Effectiveness of Invention: As explained above, this invention's resist remover is one which removes resist applied to a substrate's edges, sides and back by having installed a nozzle that encloses the edges of substrates having resist applied to their outer surfaces and has solvent supply holes, solvent discharge ports and solvent vapor exhaust ports, and uses solvent sprayed from the supply holes to remove the applied resist. I.e., with this invention's resist remover, one can remove resist that has moved around to form on the edges, sides and back of glass substrates, so that dust is not generated by such resist. Consequently, not only are the troubles caused by dust avoided, but also one can improve the throughput of parts

that use substrates, such as the glass substrates of liquid crystal panels and the like.

4. Simple Explanation of Figures

Figures 1 and 2 are diagrams to illustrate one application example of this invention, with Figure 1 being a cross-sectional diagram and Figure 2 being an oblique diagram.

1 … Glass substrate
2 … Over-nozzle
3 … Under-nozzle
4 … Supply holes
5 … Exhaust ports
6 … Discharge ports
7 … Chuck
8 … Resist
9 … Space
10 … Solvent
11 … Vapor
12 … Waste solution
21 … Sealing plate
31 … " "
71 … Substrate mounting plate
100 … Resist remover
200 … " "

Patent applicant: Sharp Corporation

Agent: Koji Onishi, Patent attorney